International Journal of Pharmacy and Technology, 2016, vol.8, N3, pages 14926-14935

Identification algorithms of simple homogeneous Markov chains of cyclic class and their complexity analysis

Nurutdinova A., Shalagin S.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016,International Journal of Pharmacy and Technology. All rights reserved.The homogeneous regular and cyclic Markov chains (MC) are widely used in modelling systems for real stochastic processes,events and phenomena. In particular,the sequence recognition tasks for the MCs generated on the basis of the ergodic stochastic matrices (ESMs) are of interest. These tasks are relevant and applicable to processing of any digital signal sequences,analyzing and testing of any discrete devices,identifying of any spoken and written language. As part of the task of the discrete Markov processes analyzing,there is a problem of effective recognition methods and algorithms choice depending on the investigated model parameters,in particular,length of the output sequence,stochastic matrix dimension and structure,and accuracy of representation of such model elements. In order to address this issue,this article proposes methods and algorithms for identifying various subclasses of the automate Markov model based on the generated cyclic Markov chains. There is the computational complexity comparative analysis of the identification algorithms. The first identification algorithm is based on the functional calculation from index of cyclic Markov chain. The second one is a modification of the forward-backward algorithm. The third one is designed to identify the sequences,which elements are partially hidden from observation.

Keywords

Computational complexity, Cyclic ergodic stochastic matrices, Identification, Markov chains